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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/068,270	05/04/1998	KENJI UCHIYAMA	9319S-000062	2146

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EXAMINER

MITCHELL, JAMES M

ART UNIT PAPER NUMBER

2827

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/068,270

Applicant(s)

UCHIYAMA, KENJI

Examiner

James Mitchell

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1,2 and 4-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. The advisory action filed February 6, 2002 is withdrawn, because no final action was filed.

Claim Rejections - 35 USC § 112

2. The amendment filed December 2, 2002 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: vacant spaces.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 8, 18, 24 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato (02164230).
5. Sato (Fig 1) discloses semiconductor device (2) connecting structure for connecting a device onto a substrate (4), characterized by a bonding layer (3) including a bonding material interposed between said device and said substrate adhering the device to the substrate, and a plurality of adjacent vacant spaces (5) formed within said bonding material that has an inherent action to absorb (English Purpose: prevent substrate from being deformed) of said device; wherein the device is inherently adhered

to the substrate by the bonding material at a substantially plane center portion of said service (via bonding material on a center portion of said device); within bonding material positioned between said spaces; wherein a percentage of a plurality of spaces is between 5 to 70%.

6. Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by Takeshi (EP 051071).

7. Takeshi discloses a semiconductor connecting method for connecting a semiconductor device onto a substrate, characterized by comprising steps of: interposing a bonding layer between said semiconductor ("IC") and said substrate (Column 1, Lines 42-45); joining said substrate and said device to each other by pressing a pressurizing head (Fig 2B), heated to a high temperature against said semiconductor device (Column 1, Lines 48-50) to pressurize and heat said bonding layer and forming vacant (understood to mean filled with a gas) spaces within said bonding layer (Column 1-2, Lines 58-3); wherein the heat process inherently decreases viscosity of said bonding layer to cause said bonding layer to flow outward from said device.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato as applied to claims 1 and further in combination with Andrews (US 5,352,926) and Muramatsu (U.S 5,893,623).

10. Sato further disclose that said bonding layer larger than mounting area (via adhesive protrudes beyond said device), but not disclose a bumps arranged in rows, or that said bonding layer is an epoxy.

11. However Andrews (Fig 1) utilizes an electrical connection through bumps (34).

It would have been obvious to one of ordinary skill in the art to form the electrical connection as a flip chip with bumps, such that the vacant spaces are between bumps in order to lower inductance as taught by Andrews (Col. 1, Lines 15-20).

12. Maramatsu utilizes an epoxy based adhesive (Lines 60-61, Column 7).

13. It would have been obvious to one of ordinary skill in the art to use an epoxy based bonding layer within a semiconductor device in order to increase moisture resistance (Lines 61-62, Column 7).

14. With respect to claim 2, Examiner takes official notice that it would have also been obvious to one of ordinary skill as well known in the art to form rows of bumps on the semiconductor chip for increased (I/O) electrical contact.

15. With respect to claims 5 and 6, the prior art does not appear to disclose that the percentage of spaces said bonding material is 5% to 70%.

16. However, it would have been obvious to one ordinary skill in the art to form the percentage of spaces within the bonding layer from 5% to 70%, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering

optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233 (CCPA 1955)

17. Claims 11-17 and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (APA) in combination with Sato and Andrews.

18. APA discloses a LCD connected between two substrates (Page 2, Paragraph 1), a semiconductor device connected to a substrate (Page 2, Paragraph 2 and 3) that has an inherent periphery that defines a mounting area, with a anisotropic conductive film bonding layer (Page 2, Paragraph 2) interposed between said substrate and said device, that inherently includes conductive particles forming bumps in a resin that connect to a plurality of electrode terminals.

19. The disclosed prior art does not show a plurality of spaces formed within a bonding layer, however the modified structure of Sato and Andrews utilizes spaces (5) close to each other within a bond layer that is larger than the mounting area and between conductive bumps.

20. It would have been obvious to one of ordinary skill in the art to form spaces within bond layer between conductive bumps and in the mounting area in order to prevent deformation as taught by Sato (English Procedure).

21. With respect to claims 15 and 16 neither the admitted prior art nor Sato or Andrews appear to disclose that the percentage of spaces said bonding material is 5% to 70%.

22. However, it would have been obvious to one ordinary skill in the art to form the percentage of spaces within the bonding layer from 5% to 70%, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (CCPA 1955).

23. With respect to claim 21, APA does not appear to disclose that the adhesive layer is larger than the mounting area.

24. In any case, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears *prima facie* that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

25. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato as applied to claim 9 and further in combination with and Muramatsu (U.S 5,893,623).

26. See paragraphs 12 and 13.

Response to Arguments

22. Applicant's arguments filed December 5, 2001 have been fully considered but they are not persuasive. Applicant contends that Yamazaki teaches spacers rather than the claimed space, and that the bonding layer does not "necessarily" absorb deformation. A spacer occupies a space within a bonding layer such that there are areas where there is no bonding material; therefore it meets the broad recitation as claimed of a space within a bonding layer. As for the issue of "absorbing deformation," when the deformation is absorbed its corresponding device or substrate does not deform, therefore since the prior art prevents the device from deforming (cracking), it absorbs deformation.

Conclusion

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Mitchell whose telephone number is (703) 305-0244. The examiner can normally be reached on M-F 10:30-8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3230 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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